Texas Department of State Health Services
Cancer Cluster Investigation Report of
16 Specific Cancer Types Occurring
In Zip Codes 77009 & 77026 in
Houston, Harris County, Texas
Covering 2001–2010

August 28, 2013

Background

Concern about a possible excess of cancer diagnoses prompted the Texas Department of State Health Services (DSHS) to examine the occurrence of various cancers in zip codes 77009 and 77026 in Houston, Texas. Local citizens were concerned that creosote or other contamination of soil and/or shallow groundwater may be causing excess cancers in the neighborhoods surrounding a closed wood treatment facility. The sites causing most of the concerns included the North and South Cavalcade sites, Dees Foundries, and other industrial sites in the area.

Data Source & Scope

For this investigation DSHS evaluated cancer incidence data over the 10-year period from 2001–2010, for cancers of the prostate, breast, lung and bronchus, colon and rectum, corpus and uterus, nasopharynx, bladder, kidney and renal pelvis, liver and intrahepatic bile duct, stomach, non-Hodgkin's lymphoma, mesothelioma, and select leukemia subtypes. DSHS obtained cancer incidence data from the Texas Cancer Registry (TCR), which tracks the numbers and types of new cancer cases diagnosed each year by age, race, sex, and place of residence within the State of Texas. Cancer incidence data are generally considered to be the best indicator of cancer occurrence, and these data for Texas currently meet national standards for timeliness and data quality. This report presents information on methods used to conduct this investigation, the results, recommendations, and general information on cancer risk factors for the cancers studied.

Cancer Cluster Investigation Methodology

DSHS follows guidelines recommended by the Centers for Disease Control and Prevention (CDC) for investigating cancer clusters.[1] If DSHS finds significantly more cancer than expected or if rare or unlikely cancers are found in unusual age groups, a number of factors are considered to determine whether a more in-depth study could potentially identify a likely cause. Very few CCIs in the United States proceed to this stage, and those that do almost invariably fail to identify a definitive cause for the apparent cluster.

According to the National Cancer Institute (NCI), a cancer cluster is a significantly greater-than-expected number of cancer cases occurring over a specified period of time among

people who live or work in the same geographical area or workplace. *Cancer cluster investigations* (CCIs) only study the rates of occurrence of new cancer cases in a particular area over time and generally only use previously collected data available from the TCR. Consequently, they are only capable of answering the simple question, "Are there more cancer cases occurring in the area or population of concern than would be expected, based on the size and demographic characteristics of that population?" It is important to note that CCIs cannot determine the likely cause of any of the cancers observed in the area of concern. Likewise, they cannot be used determine what common risk factors, specific contaminants, or exposure sources (if any) may have contributed to the observed cancer excesses (if any) in the area of concern.

Age, Race/Ethnicity, and Sex Adjustment:

Since population demographics (characteristics such as the age, race/ethnicity, and sex of those who are diagnosed with cancer) play such an important role as risk factors for many types of cancer, all of these factors must be taken into account in calculating the expected number of cancers for the area. The *expected* numbers are determined by applying the age, race/ethnicity, and sex-specific cancer incidence rates for the state to the age, race/ethnicity, and sex-specific population figures for the area of concern. Since this CCI covers the time period from 2001-2010, we have used the average of the 2000 and 2010 Census population numbers as most representative of the period studied. The total expected cancer cases for males and for females are then compared with the total *observed* new cancer cases diagnosed for males and for females living in the area, based on historical data collected by the TCR.

Standardized Incidence Ratio:

The standardized incidence ratio (SIR) is calculated from the number of observed cases divided by the number of expected cases. When the SIR of a selected cancer is equal to 1.0, then the number of observed cases is equal to the expected number of cases, based on incidence rates in the state. When the SIR for a particular cancer is less than 1.0, there are fewer cases of that type of cancer in the area than would be expected. Conversely, an SIR greater than 1.0 indicates that there are more cases of a specific type of cancer in the area than would be expected. However, since increased or decreased rates of cancer can (and frequently do) occur by chance alone, statistical methods are used in the analysis to estimate the likelihood that the resultant SIR (whether it is greater than or less than 1.0) is due to chance. Further complicating the issue, there are many different combinations of numbers of observed and expected cases that produce the same SIR; some of these will be statistically significant, others will not (depending on the underlying numbers that generated the SIR). Consequently, the SIR alone does not tell the whole story, and it should be stated or quoted only in conjunction with its corresponding test for statistical significance (such as the 95% or 99% confidence interval).

Confidence Intervals:

In this CCI we have calculated the 99% confidence interval (CI) for each SIR. This interval defines the range of values in which we would expect the SIR to fall 99% of the time. If the upper end of the CI for a specific SIR is greater than 1.0 and the lower end is less than 1.0 (i.e., the CI "contains" or "straddles" 1.0), the SIR falls within the expected range of values,

and minor (or even major) variations above or below 1.0 are considered to be *not statistically significant*. When both upper and lower ends of the CI are greater than 1.0, the SIR is said to be *significantly higher than expected* or *significantly elevated*, and when both are less than 1.0, the SIR is said to be *significantly lower than expected* or *significantly decreased*.

Confidence intervals are particularly important when trying to interpret SIRs that are based on a small number of observed cases (i.e., 1-5 cases). In these situations the SIRs may appear relatively large (i.e., 3-4 or even higher) or relatively small (i.e., 0.5 or less). However, the CIs for small numbers of observed cases are relatively wide, and even an apparently large (or small) SIR may well be not statistically significant. Wide confidence intervals (which are common when dealing with small populations, small numbers of cases, and short periods of time) reflect a greater uncertainty in the results. When the number of observed cases in the area of concern is large (10 or more cases, which happens with large populations, long time periods, and common types of cancer), the CI grows relatively narrow, and SIRs of 3-4 or even lower often turn out to be significantly higher than expected. Similarly, SIRs of 0.8–0.9 or higher combined with a narrow CI may turn out to be significantly lower than expected.

Investigation Results

Attached Tables 1–4 show the numbers of observed cases for males and females; numbers of "expected" cases; standardized incidence ratios (SIRs); and corresponding 99% CIs for the various types of cancer observed in the two zip codes. From January 1, 2001 to December 31, 2010, the number of cancers of the, breast, colon and rectum, corpus and uterus, nasopharynx, bladder, kidney/renal pelvis, stomach, non-Hodgkin's lymphoma, mesothelioma, and select leukemia subtypes were within the expected range in both males and females in zip codes 77009 and 77026 in Houston, Texas.

Lung cancers among males in zip code 77026 showed a statistically significant elevation (SIR=1.51; 99% CI=1.22–1.84), while lung cancers in females in this zip code were well within the expected range (SIR=1.12; 99% CI=0.81–1.50). In contrast, lung cancers in zip code 77009 (directly adjacent to zip 77026 on the west side) were nearly exactly what we would expect for both males (SIR=1.03; 99% CI=0.79–1.32) and females (SIR=1.03; 99% CI=0.73–1.39).

Cancers of the liver/intrahepatic bile duct among males in zip code 77009 were significantly elevated (SIR=1.57; 99% CI=1.04–2.27), while the incidence among females in the same zip code and among males and females in zip code 77026 were within the expected ranges.

Cancers of the prostate (males) in zip code 77009 were significantly decreased (SIR=0.81; 99% CI=0.66–0.99), while the incidence among males in zip code 77026 were within the expected ranges (SIR=1.15; 0.96–1.36).

Discussion

We do not know why lung cancers were significantly elevated among males in zip code 77026 or why liver/intrahepatic bile duct cancers were elevated among males in zip code

77009 compared with the rest of the state, nor why they were not elevated in females in the same zip code or in either males or females in the adjacent zip code. We also do not know why prostate cancers in zip code 77009 were significantly decreased but within the expected range in zip code 77026. Because of their inherent design limitations, CCIs are unable to address issues of causality or determine specific risk factors for any observed cancer excesses. According to the American Cancer Society, smoking accounts for 87% of all lung cancer. However, the risk factors for liver/intrahepatic bile duct cancers and prostate cancers are not nearly so clear-cut. In either case, since we have no information about any potential risk factors (such as smoking history, or work history) in the populations under study, we cannot tell whether a difference in any of these factors in the study areas may have played a role in the observed cancer excesses.

Investigation Limitations:

Like other similar studies, this cancer cluster investigation has other limitations as well. The incidence data used for the analysis did not include cancer cases diagnosed in the years since 2010 (which have not all been completely entered into the TCR database). Also, cancer incidence data are based on residence at the time of diagnosis. It is possible that some residents who developed cancer no longer lived in the area at the time of diagnosis and thus were not included in the analyses. Offsetting this, is the possibility that some individuals may have recently moved into the area and then developed a cancer that could not be related to any local environmental factors. These cases are included in the investigation and could artificially inflate the numbers for the study area. Finally, this investigation involved a large number of comparisons (observed and expected pairs). In such cases, it is not uncommon to see one or more statistically significant results, simply as a result of chance alone.

Conclusions

Since the elevated cancer rates were not consistent among males and females, were not consistent from one zip code to the other, and the cancers share few common risk factors, it is unlikely that a common environmental exposure could explain the elevations.

Recommendations

Based on the findings and the information discussed above, a more in-depth epidemiologic study of cancers in zip codes 77009 and 77026 in Houston, Texas, is not recommended at this time. As new data or additional information become available, consideration will be given to updating or re-evaluating this CCI.

Information on Cancer and Cancer Risk Factors

Overall, the occurrence of cancer is common, with approximately half of all men and one third of all women alive today predicted to develop some type of cancer in their lifetime.[2] In Texas, as in the rest of the United States, cancer is the second leading cause of death, claiming 22.8% of all deaths while heart disease (the leading cause) claims 28.5%.[3] Contrary to a common misconception, "cancer" is not a single disease, but many different diseases. Different types of cancer are generally thought to have different causes, as evidenced by their

diverse risk factors. Generally, if a person develops cancer, it is probably not due to one single factor but to a combination of factors that may include heredity; diet, tobacco use, and other lifestyle factors; infectious agents; chemical exposures; and radiation exposures. Although cancer clearly can impact individuals of all ages, it primarily is a disease of older persons with over one-half of cancer cases and over three-fourths of cancer deaths occurring in persons age 65 and older. Finally, it takes time for cancer to develop; a latency period of 10–40 years can go by between the exposure to a carcinogen and the development of a clinically diagnosable case of cancer.[4]

The chances of a person developing cancer as a result of exposure to an environmental contaminant are slight. Most experts agree that exposure to environmental pollution and occupational and industrial hazards account for fewer than 10% of cancer cases.[5] The Harvard Center for Cancer Prevention estimates 5% of cancer deaths are due to occupational factors, 2% to environmental pollution, and 2% to ionizing/ultraviolet radiation.[6] In contrast, the National Cancer Institute estimates that lifestyle factors such as tobacco use and diet cause 50 to 75 percent of cancer deaths.[7] Eating a healthy diet and refraining from tobacco use are the best ways to prevent many kinds of cancer. It is estimated that one-third of all cancer deaths in this country could be prevented by eliminating the use of tobacco products. Additionally, about 25 to 30 percent of the cases of several major cancers are thought to be associated with obesity and physical inactivity.[8]

Known Risk Factors for Cancers Studied in This Investigation:

The occurrence of cancer may vary by race/ethnicity, gender, type of cancer, geographic location, population group, and a variety of other factors. Scientific studies have identified a number of factors for various cancers that may increase an individual's risk of developing a specific type of cancer. These factors are known as cancer risk factors. Some risk factors cannot be significantly changed by the individual (e.g., gender or genetic predispositions, personal and family history, infectious disease history, unknown or inadvertent exposures to carcinogens, etc.), but many are a matter of choice (e.g., tobacco use, alcohol consumption, obesity, diet, inactivity, etc.). The following is a brief discussion summarized from the American Cancer Society and the National Cancer Institute about cancer risk factors for the specific cancers studied in this investigation.[9,10]

Prostate Cancer

Prostate cancer is the most common type of malignant cancer (other than skin) diagnosed in men, affecting an estimated one in five American men. Risk factors for prostate cancer include aging, a high fat diet, physical inactivity, and a family history of prostate cancer. African-American men are at higher risk of acquiring prostate cancer and dying from it. Prostate cancer is more common in North America and northwestern Europe. It is less common in Asia, Africa, Central America, and South America.

Breast Cancer

Simply being a woman is the main risk factor for developing breast cancer. Breast cancer can affect men, but this disease is about 100 times more common among women than men. White women are slightly more likely to develop breast cancer than are African-American

women, but African-Americans are more likely to die of this cancer because they are often diagnosed at an advanced stage when breast cancer is harder to treat and cure. Other risk factors for breast cancer include aging, presence of genetic markers such as the BRCA1 and BRCA2 genes, personal and family history of breast cancer, previous breast biopsies, previous breast irradiation, diethylstilbestrol (DES) therapy, oral contraceptive use, not having children, hormone replacement therapy, drinking alcohol, and obesity. Secondhand smoke may also be a risk factor. Currently, research does not show a link between breast cancer risk and environmental pollutants such as the pesticide DDE (chemically related to DDT) and PCBs (polychlorinated biphenyls).

Lung and Bronchus Cancer

The greatest single risk factor for lung cancer is smoking. The American Cancer Society estimates that 87% of lung cancer is due to smoking. Several studies have shown that the lung cells of women have a genetic predisposition to develop cancer when they are exposed to tobacco smoke. Other risk factors include secondhand smoke, asbestos exposure, radon exposure, other carcinogenic agents in the workplace such as arsenic or vinyl chloride, marijuana smoking, recurring inflammation of the lungs, exposure to industrial grade talc, preexisting silicosis or berylliosis, personal and family history of lung cancer, and diet.

Colon and Rectum Cancer

Researchers have identified several risk factors that increase a person's chance of developing colorectal cancer, including family and personal history of colorectal cancer, hereditary conditions such as familial adenomatous polyposis, personal history of intestinal polyps with chronic inflammatory bowel disease, aging, consumption of a diet mostly from animal sources, physical inactivity, obesity, smoking, and heavy use of alcohol. People with diabetes have a 30%-40% increased chance of developing colon cancer. Recent research has found a genetic mutation leading to colorectal cancer in Jews of Eastern European descent (Ashkenazi Jews).

Corpus and Uterus Cancer

Corpus and uterus cancer include cancer of the endometrium (lining of the uterus). Risk factors for endometrial cancer include menstrual periods before age 12, menopause after age 52, infertility or not having children, obesity, treatment with the drug Tamoxifen, estrogen replacement therapy, certain ovarian diseases, a diet high in animal fat, diabetes, aging, family history of endometrial cancer, and early pelvic radiation therapy. Women who have had breast or ovarian cancer may have increased risk of getting endometrial cancer.

Nasopharyngeal Cancer

Risk factors for nasopharyngeal cancer (NPC) include gender (males are more than twice as likely to get NPC as females), Epstein-Barr virus infection, race/ethnicity (Chinese-Americans have a higher incidence of NPC than African-Americans, Hispanics, or whites), family history of NPC, genetic factors such as tissue types, and diets high in salt-cured fish and meat.

Bladder Cancer

The greatest risk factor for bladder cancer is smoking. Men get bladder cancer at a rate four times that of women. Smokers are more than twice as likely to get bladder cancer as nonsmokers. Whites are two times more likely to develop bladder cancer than are African-Americans. Other risk factors for bladder cancer include occupational exposure to aromatic amines such as benzidine and beta-naphthylamine, aging, chronic bladder inflammation, personal history of urothelial (transitional cell) carcinomas, birth defects involving the bladder and umbilicus, infection with a certain parasite, high doses of certain chemotherapy drugs, and arsenic in your drinking water.

Kidney and Renal Pelvis Cancer

Kidney cancer risk factors include smoking, obesity, a sedentary lifestyle, occupational exposure to heavy metals or organic solvents, advanced kidney disease, family history, high blood pressure, certain medications, and aging. Men and African-Americans have higher rates of kidney cancer.

Liver and Intrahepatic Bile Duct Cancer

In contrast to many other types of cancer, the number of people who develop liver cancer and die from it is increasing. This cancer is about 10 times more common in developing countries. The risk factors for liver cancer include viral hepatitis, cirrhosis, long-term exposure to aflatoxin, exposure to vinyl chloride and thorium dioxide, older forms of birth control pills, anabolic steroids, arsenic in drinking water, tobacco use, bile duct disease, ulcerative colitis, liver fluke infection, and aging. Chemicals that are associated with bile duct cancer include dioxin, nitrosamines, and polychlorinated biphenyls (PCBs).

Stomach Cancer

Stomach cancer is about twice as common in men as it is in women. Other risk factors for stomach cancer include Helicobacter pylori infection, diets high in smoked and salted foods, tobacco and alcohol abuse, previous stomach surgery, pernicious anemia, type A blood type, familial cancer syndromes, aging, obesity, Epstein-Barr virus infection, and stomach polyps. Japanese have a very high rate of stomach cancer when they live in Japan. If they move to the United States, the rate goes down after a number of years, but still remains higher than that of people born in the U.S.

Non-Hodgkin's Lymphoma

Risk factors for non-Hodgkin's lymphoma include infection with Helicobacter pylori, human immunodeficiency virus (HIV), human T-cell leukemia/lymphoma virus (HTVL-1), the Epstein-Barr virus, and malaria. Other possible risk factors include obesity, aging, certain genetic diseases, radiation exposure, immunosuppressant drugs after organ transplantation, benzene exposure, the drug Dilantin, exposure to certain pesticides, a diet high in meats or fat, or certain chemotherapy drugs.

Malignant Mesothelioma

Most cases of malignant mesothelioma have been linked to asbestos exposure in the workplace. Environmental exposures to zeolites (silicate minerals that are chemically related to asbestos) have been tentatively linked with excesses in malignant mesothelioma cases. For example, the high mesothelioma rates in parts of Turkey, that have naturally high zeolite content in rocks and soil, are believed to be related to widespread exposure to this mineral. While smoking has not been found to cause mesothelioma, researchers have, however, found that smoking can weaken the body's lungs and reduce the body's ability to expel the asbestos fibers once they are inside the body. Other possible risk factors for mesothelioma include high dose radiation exposure and infection with simian virus 40.

Acute Lymphocytic Leukemia (ALL)

Possible risk factors for ALL include the following: being male, being white, being older than 70 years of age, past treatment with chemotherapy or radiation therapy, exposure to atomic bomb radiation, or having a certain genetic disorder such as Down syndrome.

Chronic Lymphocytic Leukemia (CLL)

Possible risk factors for CLL include the following: being middle-aged or older, male, or white; a family history of CLL or cancer of the lymph system; having relatives who are Russian Jews or Eastern European Jews; or having exposure to herbicides or insecticides including Agent Orange, an herbicide used during the Vietnam War.

Acute Myeloid Leukemia (AML)

Possible risk factors for AML include the following: being male; smoking, especially after age 60; treatment with chemotherapy or radiation therapy in the past; treatment for childhood ALL in the past; being exposed to atomic bomb radiation or the chemical benzene; or having a history of a blood disorder such as myelodysplastic syndrome.

Chronic Myeloid Leukemia (CML)

Most people with CML have a gene mutation (change) called the Philadelphia chromosome. The Philadelphia chromosome results from a translocation defect, in which a piece of chromosome 9 and a piece of chromosome 22 break off and switch places with each other. Because the Philadelphia chromosome is found only in the leukemia cells (i.e., blood cells and not germ cells) the defect is not passed from parent to child.

Additional Information

For additional information about cancer, visit the “Resources” link on the DSHS Web site at http://www.dshs.state.tx.us/tcr/.

Questions or comments regarding this investigation may be directed to Richard A. Beauchamp, M.D., Senior Medical Toxicologist, Exposure Assessment, Surveillance, and Toxicology Group at 512-776-6434, email: Richard.Beauchamp@dshs.state.tx.us.

References

1. Guidelines for Investigating Clusters of Health Events, Centers for Disease Control and Prevention, MMWR 1990; 39 (RR-11): 1-16.

2. American Cancer Society Website: http://www.cancer.org/cancer/cancerbasics/what-is-cancer. Retrieved 06/10/13.

3. Cancer Statistics, 2005. CA, Cancer Journal for Clinicians. 2005: 55:10-30. Available online: http://onlinelibrary.wiley.com/doi/10.3322/canjclin.55.1.10/abstract. Retrieved 06/10/13.

4. National Cancer Institute Website: http://www.cancer.gov/cancertopics/factsheet/Risk/clusters. Retrieved 06/10/13.

5. Cancer: What Causes It, What Doesn't. Published by the American Cancer Society, 2003. Available at the American Cancer Society Website: http://acs.bookstore.ipgbook.com/cancer--what-causes-it--what-doesn-t-products-9780944235447.php?page_id=32&pid=ACN.

6. Harvard Reports on Cancer Prevention. Harvard Center for Cancer Prevention. Volume 1: Human Causes of Cancer. Harvard School of Public Health Website: http://www.health.harvard.edu/newsletters/Harvard_Mens_Health_Watch/2009/April/The-10-commandments-of-cancer-prevention.

7. Cancer Trends Progress Report – 2005 Update. National Cancer Institute Website: http://progressreport.cancer.gov/2005/doc.asp?pid=1&did=2005&mid=vcol&chid=21.

8. Cancer and the Environment. Published by the National Cancer Institute (NCI) and the National Institute on Environmental Health Sciences, 2003. http://www.niehs.nih.gov/health/materials/cancer_and_the_environment_508.pdf.

9. American Cancer Society website. http://www.cancer.org. Retrieved 06/10/2013.

10. National Cancer Institute website: http://www.nci.nih.gov/. Retrieved 06/10/2013.

Table 1. Numbers of Observed and Expected Male Cancer Cases, Standardized Incidence Ratios, and 99% Confidence Intervals for Selected Cancers in Zip Code 77009, Houston, TX, 2001–2010^

Males				
Cancer Site/Morphology	**Observed**	**Expected**	**SIR**	**99% CI**
Prostate	**170**	**209.5**	**0.81****	**0.66 – 0.99**
Breast	1	1.37	0.73	0.00 – 5.43
Lung & Bronchus	105	102.2	1.03	0.79 – 1.32
Colon & Rectum	84	85.3	0.98	0.73 – 1.30
Nasopharynx	0	1.28	0.00	0.00 – 4.13
Bladder	29	32.7	0.89	0.52 – 1.41
Kidney/Renal Pelvis	32	39.6	0.81	0.49 – 1.25
Liver/Intrahepatic Bile Duct	**47**	**29.9**	**1.57***	**1.04 – 2.27**
Stomach	12	20.0	0.60	0.25 – 1.21
Non-Hodgkin's Lymphoma	41	33.6	1.22	0.79 – 1.80
Mesothelioma	2	1.98	1.01	0.05 – 4.68
Acute Lymphocytic Leukemia	6	4.38	1.37	0.35 – 3.57
Chronic Lymphocytic Leukemia	9	6.78	1.33	0.46 – 2.95
Acute Myeloid Leukemia	8	6.03	1.33	0.43 – 3.08
Chronic Myeloid Leukemia	6	3.42	1.75	0.45 – 4.58
Aleukemic, Subleukemic, & NOS	0	1.20	0.00	0.00 – 4.40

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009. The SIR has been rounded to the first decimal place. Incidence rates for 2000-2009 were used because completeness for 2010 is less than 95% at this time.

*Significantly higher than expected at the $p < 0.01$ level.
**Significantly lower than expected at the $p < 0.01$ level.

^The number of cancers diagnosed in 2010 is lower than expected, due to (1) non-reporting of records by military and one Veterans Administration hospital, (2) cancer treatment center reporting delays, and (3) record processing delays related to the conversion to the new TCR software. The number of cases diagnosed in 2010 will increase in next year's incident file, expected to be available no later than March 2014.

^In the 1995-2010 file prepared in April 2013, compared to the 1995-2009 file prepared in February 2012, the number of cases diagnosed in 1995-2003 and 2005 increased by 3%. The primary reason for this change is that, in all previous analysis file, cases reported to the TCR with only a date of admission/first contact and lacking a date of diagnosis, were not included in the analysis file. In contrast, in the 1995-2010 file, date of admission/first contact was used to estimate month and year of diagnosis for those cases, and they were added to the analysis file. Preparations for the conversion to the new TCR software also identified additional multiple primary cases from reports pending processing.

Table 2. Numbers of Observed and Expected Female Cancer Cases, Standardized Incidence Ratios, and 99% Confidence Intervals for Selected Cancers in Zip Code 77009, Houston, TX, 2001–2010^

Females				
Cancer Site/Morphology	**Observed**	**Expected**	**SIR**	**99% CI**
Breast	192	191.4	1.00	0.83 – 1.20
Lung & Bronchus	68	66.3	1.03	0.73 – 1.39
Colon & Rectum	61	66.7	0.91	0.64 – 1.26
Corpus & Uterus	28	35.1	0.80	0.46 – 1.27
Nasopharynx	0	0.47	0.00	0.00 – 11.3
Bladder	9	10.4	0.86	0.30 – 1.92
Kidney/Renal Pelvis	25	24.9	1.00	0.56 – 1.65
Liver/Intrahepatic Bile Duct	8	11.9	0.67	0.22 – 1.57
Stomach	16	13.5	1.18	0.56 – 2.18
Non-Hodgkin's Lymphoma	33	28.9	1.14	0.70 – 1.80
Mesothelioma	2	0.59	3.40	0.18 – 15.8
Acute Lymphocytic Leukemia	6	3.49	1.72	0.44 – 4.49
Chronic Lymphocytic Leukemia	5	4.68	1.07	0.23 – 3.02
Acute Myeloid Leukemia	7	4.95	1.41	0.41 – 3.46
Chronic Myeloid Leukemia	4	2.58	1.55	0.26 – 4.88
Aleukemic, Subleukemic, & NOS	2	1.19	1.69	0.09 – 7.81

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009. The SIR has been rounded to the first decimal place. Incidence rates for 2000-2009 were used because completeness for 2010 is less than 95% at this time.

*Significantly higher than expected at the $p < 0.01$ level.
**Significantly lower than expected at the $p < 0.01$ level.

^The number of cancers diagnosed in 2010 is lower than expected, due to (1) non-reporting of records by military and one Veterans Administration hospital, (2) cancer treatment center reporting delays, and (3) record processing delays related to the conversion to the new TCR software. The number of cases diagnosed in 2010 will increase in next year's incident file, expected to be available no later than March 2014.

^In the 1995-2010 file prepared in April 2013, compared to the 1995-2009 file prepared in February 2012, the number of cases diagnosed in 1995-2003 and 2005 increased by 3%. The primary reason for this change is that, in all previous analysis file, cases reported to the TCR with only a date of admission/first contact and lacking a date of diagnosis, were not included in the analysis file. In contrast, in the 1995-2010 file, date of admission/first contact was used to estimate month and year of diagnosis for those cases, and they were added to the analysis file. Preparations for the conversion to the new TCR software also identified additional multiple primary cases from reports pending processing.

Table 3. Numbers of Observed and Expected Male Cancer Cases, Standardized Incidence Ratios, and 99% Confidence Intervals for Selected Cancers in Zip Code 77026, Houston, TX, 2001–2010^

Males				
Cancer Site/Morphology	**Observed**	**Expected**	**SIR**	**99% CI**
Prostate	235	204.6	1.15	0.96 – 1.36
Breast	2	1.34	1.49	0.08 – 6.92
Lung & Bronchus	**163**	**107.9**	**1.51***	**1.22 – 1.84**
Colon & Rectum	86	71.9	1.20	0.89 – 1.57
Nasopharynx	3	1.10	2.73	0.31 – 10.0
Bladder	16	18.1	0.88	0.42 – 1.63
Kidney/Renal Pelvis	26	26.8	0.97	0.55 – 1.58
Liver/Intrahepatic Bile Duct	32	20.8	1.54	0.93 – 2.38
Stomach	19	16.9	1.12	0.57 – 1.97
Non-Hodgkin's Lymphoma	16	19.6	0.82	0.39 – 1.51
Mesothelioma	0	1.22	0.00	0.00 – 4.35
Acute Lymphocytic Leukemia	7	2.19	3.20	0.93 – 7.83
Chronic Lymphocytic Leukemia	5	5.48	0.91	0.20 – 2.58
Acute Myeloid Leukemia	8	3.76	2.13	0.68 – 4.94
Chronic Myeloid Leukemia	2	2.32	0.86	0.04 – 3.99
Aleukemic, Subleukemic, & NOS	0	0.85	0.00	0.00 – 6.21

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009. The SIR has been rounded to the first decimal place. Incidence rates for 2000-2009 were used because completeness for 2010 is less than 95% at this time.

*Significantly higher than expected at the $p < 0.01$ level.
**Significantly lower than expected at the $p < 0.01$ level.

^The number of cancers diagnosed in 2010 is lower than expected, due to (1) non-reporting of records by military and one Veterans Administration hospital, (2) cancer treatment center reporting delays, and (3) record processing delays related to the conversion to the new TCR software. The number of cases diagnosed in 2010 will increase in next year's incident file, expected to be available no later than March 2014.

^In the 1995-2010 file prepared in April 2013, compared to the 1995-2009 file prepared in February 2012, the number of cases diagnosed in 1995-2003 and 2005 increased by 3%. The primary reason for this change is that, in all previous analysis file, cases reported to the TCR with only a date of admission/first contact and lacking a date of diagnosis, were not included in the analysis file. In contrast, in the 1995-2010 file, date of admission/first contact was used to estimate month and year of diagnosis for those cases, and they were added to the analysis file. Preparations for the conversion to the new TCR software also identified additional multiple primary cases from reports pending processing.

Table 4. Numbers of Observed and Expected Female Cancer Cases, Standardized Incidence Ratios, and 99% Confidence Intervals for Selected Cancers in Zip Code 77026, Houston, TX, 2001–2010^

Females				
Cancer Site/Morphology	**Observed**	**Expected**	**SIR**	**99% CI**
Breast	157	146.8	1.07	0.86 – 1.31
Lung & Bronchus	74	66.3	1.12	0.81 – 1.50
Colon & Rectum	92	70.0	1.31	0.99 – 1.71
Corpus & Uterus	26	25.7	1.01	0.57 – 1.64
Nasopharynx	0	0.53	0.00	0.00 – 9.97
Bladder	10	9.04	1.11	0.41 – 2.37
Kidney/Renal Pelvis	16	18.7	0.86	0.40 – 1.58
Liver/Intrahepatic Bile Duct	13	7.24	1.79	0.77 – 3.52
Stomach	17	12.0	1.42	0.69 – 2.56
Non-Hodgkin's Lymphoma	21	17.0	1.24	0.65 – 2.12
Mesothelioma	0	0.36	0.00	0.00 – 14.7
Acute Lymphocytic Leukemia	4	1.71	2.34	0.39 – 7.37
Chronic Lymphocytic Leukemia	6	3.77	1.59	0.41 – 4.15
Acute Myeloid Leukemia	4	3.63	1.10	0.18 – 3.47
Chronic Myeloid Leukemia	3	1.87	1.60	0.18 – 5.87
Aleukemic, Subleukemic, & NOS	1	1.03	0.97	0.00 – 7.22

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009. The SIR has been rounded to the first decimal place. Incidence rates for 2000-2009 were used because completeness for 2010 is less than 95% at this time.

*Significantly higher than expected at the $p < 0.01$ level.
**Significantly lower than expected at the $p < 0.01$ level.

^The number of cancers diagnosed in 2010 is lower than expected, due to (1) non-reporting of records by military and one Veterans Administration hospital, (2) cancer treatment center reporting delays, and (3) record processing delays related to the conversion to the new TCR software. The number of cases diagnosed in 2010 will increase in next year's incident file, expected to be available no later than March 2014.

^In the 1995-2010 file prepared in April 2013, compared to the 1995-2009 file prepared in February 2012, the number of cases diagnosed in 1995-2003 and 2005 increased by 3%. The primary reason for this change is that, in all previous analysis file, cases reported to the TCR with only a date of admission/first contact and lacking a date of diagnosis, were not included in the analysis file. In contrast, in the 1995-2010 file, date of admission/first contact was used to estimate month and year of diagnosis for those cases, and they were added to the analysis file. Preparations for the conversion to the new TCR software also identified additional multiple primary cases from reports pending processing.